

WHAT IS CLAIMED IS:

1        1. An arrayed waveguide grating, comprising:  
2        a substrate;  
3        a first channel waveguide disposed on the substrate;  
4        a channel waveguide array disposed on said substrate and  
5        constituted in such that each length of waveguides is sequentially  
6        longer with a predetermined difference in lengths of the waveguides;  
7        a first slab waveguide disposed on said substrate and  
8        connecting said first channel waveguide with said channel waveguide  
9        array;  
10       a second slab waveguide disposed on said substrate and  
11       connecting an end of said channel waveguide array on the side wherein  
12       said first slab waveguide has not been connected thereto with an  
13       end thereof; and  
14       a second channel waveguide disposed on said substrate and  
15       connected to the other end of said second slab waveguide wherein  
16       a waveguide part in the connected area has a parabolic configuration.

1       2. An arrayed waveguide grating, comprising:  
2       a substrate;  
3       a first channel waveguide disposed on the substrate;  
4       a channel waveguide array disposed on said substrate and  
5       constituted in such that each length of waveguides is sequentially  
6       longer with a predetermined difference in lengths of the waveguides;  
7       a first slab waveguide disposed on said substrate and  
8       connecting said first channel waveguide with said channel waveguide  
9       array;

10           a second slab waveguide disposed on said substrate and  
11     connecting an end of said channel waveguide array on the side wherein  
12     said first slab waveguide has not been connected thereto with an  
13     end thereof; and

14           a second channel waveguide disposed on said substrate and  
15     connected to the other end of said second slab waveguide wherein  
16     a waveguide part in the connected area has a configuration as a  
17     multi-mode interference in which a width of optical waveguide  
18     changes step-functionally and discontinuously.

1           3. An arrayed waveguide grating, comprising:

2           a substrate;

3           a first channel waveguide disposed on the substrate;

4           a channel waveguide array disposed on said substrate and  
5     constituted in such that each length of waveguides is sequentially  
6     longer with a predetermined difference in lengths of the waveguides;

7           a first slab waveguide disposed on said substrate and  
8     connecting said first channel waveguide with said channel waveguide  
9     array;

10           a second slab waveguide disposed on said substrate and  
11     connecting an end of said channel waveguide array on the side wherein  
12     said first slab waveguide has not been connected thereto with an  
13     end thereof; and

14           a second channel waveguide disposed on said substrate and  
15     connected to the other end of said second slab waveguide wherein  
16     a waveguide part in the connected area has a rectangular field  
17     distribution exciting configuration that excites a rectangular  
18     field distribution.

SUBSTITUTE SPECIFICATION

1           4. An arrayed waveguide grating as claimed in claim 1,  
2 wherein:  
3           said parabolic configuration is individually adjusted in  
4 response to respective wavelengths of multiplexed optical signals  
5 input to said first channel waveguide.

1           5. An arrayed waveguide grating as claimed in claim 2,  
2 wherein:  
3           said configuration as a multi-mode interference is indi-  
4 vidually adjusted in response to respective wavelengths of  
5 multiplexed optical signals input to said first channel waveguide.

1           6. An arrayed waveguide grating as claimed in claim 3, wherein:  
2           said rectangular field distribution exciting configuration  
3 is individually adjusted in response to respective wavelengths of  
4 multiplexed optical signals input to said first channel waveguide.

1           7. An arrayed waveguide grating as claimed in claim 3,  
2 wherein:  
3           said rectangular field distribution exciting configuration  
4 is such a configuration that an angle  $\theta_w$  defined by a boundary part  
5 of an outputting channel waveguide in a starting point from which  
6 a width of waveguide changes and a central axis of the waveguide  
7 has a value larger than zero degree and smaller than ninety degrees,  
8 and tapered configurations are excluded from these resulting  
9 configurations.

1           8. An optical communication system, comprising:

2           an optical transmission means for delivering optical signals  
3   having respective wavelengths in parallel;

4           a multiplexer composed of arrayed waveguide gratings for  
5   subjecting the optical signals having the respective wavelengths  
6   delivered from said optical transmission means to wavelength  
7   division multiplexing;

8           an optical transmission line for transmitting the optical  
9   signals which have been wavelength division-multiplexed and output  
10   from said multiplexer;

11          nodes each provided with an arrayed waveguide grating disposed  
12   properly in the middle of said optical transmission line;

13          a demultiplexer composed of an arrayed waveguide gratings to  
14   which optical signals delivered through said nodes disposed on said  
15   optical transmission line are input to separate into each of optical  
16   signals having respective wavelengths; and

17          an optical receiver for receiving optical signals having the  
18   respective wavelengths separated by said demultiplexer;

19          each of said arrayed waveguide gratings being composed of a  
20   substrate; a first channel waveguide disposed on the substrate;  
21   a channel waveguide array disposed on said substrate and constituted  
22   in such that each length of waveguides is sequentially longer with  
23   a predetermined difference in lengths of the waveguides; a first  
24   slab waveguide disposed on said substrate and connecting said first  
25   channel waveguide with said channel waveguide array; a second slab  
26   waveguide disposed on said substrate and connecting an end of said  
27   channel waveguide array on the side wherein said first slab waveguide  
28   has not been connected thereto with an end thereof; and a second

29 channel waveguide disposed on said substrate and connected to the  
30 other end of said second slab waveguide wherein a waveguide part  
31 in the connected area has a rectangular field distribution exciting  
32 configuration that excites a rectangular field distribution.

1           9. An optical communication system, comprising:  
2           an arrayed waveguide grating having a circular transmission  
3 line prepared by connecting circularly a plurality of nodes by means  
4 of transmission lines and transmitting optical signals which have  
5 been wavelength division-multiplexed to these transmission lines,  
6 and separating the wavelength division-multiplexed optical signals  
7 into optical signals having respective wavelengths; and  
8           an arrayed waveguide grating for wavelength divi-  
9 sion-multiplexing optical signals, which have been separated into  
10 those having respective wavelengths;  
11          each of these respective arrayed waveguide gratings being  
12 composed of a substrate; a first channel waveguide disposed on the  
13 substrate; a channel waveguide array disposed on said substrate  
14 and constituted in such that each length of waveguides is se-  
15 quentially longer with a predetermined difference in lengths of  
16 the waveguides; a first slab waveguide disposed on said substrate  
17 and connecting said first channel waveguide with said channel  
18 waveguide array; a second slab waveguide disposed on said substrate  
19 and connecting an end of said channel waveguide array on the side  
20 wherein said first slab waveguide has not been connected thereto  
21 with an end thereof; and a second channel waveguide disposed on  
22 said substrate and connected to the other end of said second slab  
23 waveguide wherein a waveguide part in the connected area has a

- 24 rectangular field distribution exciting configuration that excites
- 25 a rectangular field distribution.